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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Patent Application of

Alan R. Arthur et al.

Application No. 10/677,024

Filed: September 30, 2003

For: Method of Forming an Interface Between Components Having Different Rates of Expansion

Group Art Unit: 1795

Examiner: Chuo, Tony Sheng Hsiang

Confirmation No.: 9379

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to Appellants' filing of an Appeal Brief on 19 February 2008, the Examiner of this application reopened prosecution with a non-final Office Action dated 14 April 2008 (the "Office Action" or the "Action"). Having reviewed the new grounds of rejection raised in the Office Action of 14 April, Appellants hereby request re-instatement of the appeal in this application and files the present, updated Appeal Brief, along with a new Notice of Appeal, in support of the re-instated appeal.

I. Real Party in Interest

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

II. Related Appeals and Interferences

There are no appeals or interferences related to the present application of which the Appellant is aware.

III. Status of Claims

Under a previous Restriction Requirement, claims 32-47 were withdrawn from consideration and cancelled without prejudice or disclaimer.

In the final Office Action, claims 12-31 were allowed and are, therefore, not at issue in this appeal. Consequently, the Appendix does not include claims 12-31. The Examiner further indicated the presence of allowable subject matter in dependent claims 2-8.

Only claims 1 and 9-11 were finally rejected in the final Office Action. Accordingly, Appellant appeals from the final rejection of claims 1 and 9-11, which claims are presented in the Appendix.

IV. Status of Amendments

No amendments have been filed subsequent to the final Office Action of 30 October 2007 or the most recent Action of 14 April 2008, from which Appellant takes this appeal.

V. Summary of Claimed Subject Matter

Appellant's specification discloses and claims a method of forming a component interface for use between components of differential volumetric growth rates. In various embodiments, this method may include steps such as determining dimensional characteristics of a component, defining an axis of volumetric expansion, defining a center of growth, defining a sphere centered on the center of growth, projecting the component onto the sphere to define a projection line, and forming an interface where a number of planes defining the interface each include a point on the projection line, the tangent to that point on the projection line, and the center of growth. The surface tangent to each of those planes defines the surface of the desired interface.

The only independent claim at issue on this appeal, claim 1, recites:

A method of forming an interface between components having different rates of volumetric expansion (***Appellant's specification, paragraph 0014***), said method comprising forming an interface surface (110) (***Appellant's specification, paragraphs 0017 and 0032***) of said interface with respect to a center of growth (120) (***Appellant's specification, paragraph 0018***) such that slippage occurs at said interface between said components during volumetric expansion (***Appellant's specification, paragraph 0026***).

VI. Grounds of Rejection to be Reviewed on Appeal

The final Office Action raised the following grounds of rejection.

(1) Claim 1 was rejected under 35 U.S.C. § 102(b) as being anticipated by JP 04-355953 to Ito ("Ito").

(2) Claims 1 and 9 were alternatively rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,577,795 to Bennett ("Bennet").

(3) Claims 1 and 9-11 were rejected under 35 U.S.C. § 103(a) over the combined teachings of U.S. Patent No. 6,677,069 to Piascik et al. ("Piascik") and Bennett.

According, Appellant hereby requests review of each of these grounds of rejection in the present appeal.

VII. Argument

(1) Claim 1 is patentable over Ito:

Claim 1 recites: "A method of forming an interface between components having different rates of volumetric expansion, said method comprising forming an interface surface of said interface with respect to a center of growth such that slippage occurs at said interface between said components during volumetric expansion." It is important, initially, to appreciate what claim 1 is actually reciting. The Office Action does not appear to grasp the content or import of claim 1.

Firstly, claim 1 recites a method that is performed "with respect to a center of growth." Appellant's specification defines "center of growth" as a specific term of art. According to Appellant's specification, "the center of growth (130) is the intersection of the lines drawn along interfaces between the components." (Appellant's specification, paragraph 0026). "The center of growth is a point at which two or more planes containing a portion of an interface or interfaces between two components intersect." (Appellant's specification, paragraph 0015). "The center of growth (120) is also a point that will be at the intersection of two or more planes which each include a portion of one or more interface surfaces between components." (Appellant's specification, paragraph 0020).

Appellant wishes to point out most forcefully that the concept of "center of growth" has not been found in any prior art reference cited throughout the prosecution of this application. The concept of "center of growth," as defined in Appellant's specification, appears to be the exclusive invention of the Appellant. There is no other reference of record that teaches or suggests what a "center of growth" is as defined and claimed by the Appellant. Consequently, none of the prior art of record can teach or suggest how to determine a center of growth. This subject matter is found only in Appellant's specification.

Returning to claim 1, as noted above, claim 1 recites a method that is performed "with respect to a center of growth." Consequently, claim 1 requires that a center of growth is first determined for a proposed interface between components *before* the interface is formed. This is necessary so that the subsequent method step of "forming an interface surface of said interface" can then be performed "with respect to [the] center of growth." The interface surface cannot be formed with respect to the center of growth, if the center of growth has not been determined.

Given this explanation, Appellant respectfully submits that if the cited prior art does not teach what a center of growth is, it is impossible for that art to then teach or suggest a method in which the center of growth is first determined so that an interface surface can then be formed with respect to that center of growth.

Appellant's point, in this regard, is born out by the deficient arguments in the recent Action regarding Ito. According to the Action, Ito "discloses a method of dispersing stress by forming an interface between components having different rates of thermal expansion (molybdenum plate '15' and copper plate '8') such that when thermal expansion is induced by heating, a slide occurs at an interface between the plates '8' and '15'." (Action, p. 2).

Appellant respectfully submits that this explanation of Ito's teachings is entirely irrelevant to the subject matter of claim 1. The Action has not alleged or explained how Ito anticipates the claimed method in which a center of growth is first determined and so that "forming an interface surface of said interface" can then be performed "with respect to [the] center of growth."

The Action continues. "According to the applicant's specification, a center of growth is a point at which two or more planes containing a portion of an interface between components intersect. The Ito reference teaches forming an interface between two plates

which inherently would be formed at a point where two planes containing a portion of an interface between the two plates intersect." (Action, p. 3). As before, this is wholly irrelevant to what claim 1 actually recites.

In the first place, Ito does not teaching anything about the act of forming an interface. Rather, Ito merely describes an interface that has already been formed. In at least this respect, Ito is entirely irrelevant to claim 1.

Additionally, claim 1 does not claim an interface "formed at a point where two planes containing a portion of an interface between the two plates intersect." (Action, p. 3). This language is wholly irrelevant to what Appellant actually claims. Rather, as explained above, claim 1 recites a center of growth that is first determined for a proposed interface between components so that the subsequent method step of "forming an interface surface of said interface" can then be performed "with respect to [the] center of growth." (Claim 1).

Consequently, Ito is utterly irrelevant to, and fails to anticipate any of the subject matter of, claim 1.

"A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). See M.P.E.P. § 2131. Therefore, for at least the reasons explained here, Ito does not and cannot anticipated claim 1. Therefore, the rejection based on Ito of claim 1 and its dependent claims should not be sustained.

(2) Claims 1 and 9 are patentable over Bennett:

The Bennett reference is as inapplicable to claim 1 as is Ito and for largely the same reasons. Like Ito, Bennett does not teach or suggest anything regarding a center of growth. As noted above, this concept is exclusive to Appellant's invention.

The recent Office Action explained Bennett as follows.

> The Bennett reference discloses a method of forming an interface between components having different rates of thermal expansion (carbide blank '42" and steel shaft '44') such that the interface between the components is aligned with the direction of the resultant thermal expansion so that the one component slides upon the other component during such an expansion (See column 2, lines 10-14). It also discloses a method of determining the total resultant expansion of interface point '62' (center of growth) on the interface between abutting flanks '50' & '56', wherein an increase in temperature results in sliding between the abutting flanks (See column 4, lines 16-65). It also discloses that if this method [is] performed with both carbide and steel raised to the maximum temperature expected in operation and then allowed to cool, the assembly will automatically be capable of operating at that particular temperature without encountering unwanted interference (See column 4, lines 52.56).

(Action, p. 3).

Clearly, this is almost entirely irrelevant to Appellant's claim 1. This argument in no way explains how or where Bennett teaches the claimed method of forming an interface surface with respect to determined center of growth.

More specifically, the Office Action has not alleged or explained where or how Bennett teaches the concept of a center of growth as disclosed and claimed by the Appellant. Rather, the Action again confuses center of growth with a point at the interface. This is evident by the Examiner's statement equating "interface point '62' [with] (center of growth)." (*Id.*). As clearly shown in the example of Fig. 2B from Appellant's specification, a center of growth (130) may *not* be a point at the interface between components.

Because Bennett, like all the other prior art of record, does not teach or suggest Appellant's concept of a center of growth, Bennett cannot teach or suggest the claimed method in which a center of growth is first determined for a proposed interface between

components so that the subsequent method step of "forming an interface surface of said interface" can then be performed "with respect to [the] center of growth." (Claim 1). This subject matter is entirely outside the teachings of Bennett.

"A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). See M.P.E.P. § 2131. Therefore, for at least the reasons explained here, Bennett does not and cannot anticipated claim 1. Therefore, the rejection based on Bennett of claim 1 and its dependent claims should not be sustained.

(3) Claims 1 and 9-11 are patentable over Piascik and Bennett:

As with all the other prior art references of record, Piascik and Bennett do not teach or suggest Appellant's concept of center of growth and, therefore, cannot teach or suggest Appellant's method "comprising forming an interface surface of said interface with respect to a center of growth such that slippage occurs at said interface between said components during volumetric expansion." The inapplicability of Bennett to the claimed subject matter has already been established above.

According to the recent Office Action, Piascik teaches "a radial solid oxide fuel cell stack ... comprising components that have different rates of volumetric expansion." (Office Action, p. 4). However, Piascik does not teach or suggest anything about a center of growth or a *method* of forming an interface with respect to a center of growth. The recent Office Action concedes that "Piascik does not expressly teach a method of forming an interface comprising a step of forming an interface surface with respect to a center of growth." (Action, p. 4).

Consequently, the Action cites Bennett. (*Id.*). However, as has been amply demonstrated above, Bennett does not, in fact, teach or suggest Appellant's claimed concept of center of growth or the claimed method "comprising forming an interface surface of said interface with respect to a center of growth such that slippage occurs at said interface between said components during volumetric expansion."

Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Piascik and Bennett, did not include the method recited in claim. The subject matter disclosed and claimed by Appellant appears to be entirely beyond the scope of the cited prior art.

These differences between the cited prior art and the claimed subject matter are significant because Appellant's claims provide a method of making an interface for a thermally cycled component assembly that minimizes or eliminates stress due to differential expansion rates of the components interfaced. (Appellant's specification, paragraph 0017). The techniques and advantages provided by Appellant's methods do not appear to have been available in the prior art.

Consequently, Piascik and Bennett cannot support a rejection of any of Appellant's claims under § 103(a) and *Graham*. Therefore, the rejection based on Piascik and Bennett should not be sustained.

In view of the foregoing, it is submitted that the final rejection of the pending claims is improper and should not be sustained. Therefore, a reversal of the Rejection of April 14, 2008 is respectfully requested.

Respectfully submitted,

DATE: July 8, 2008

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Rebecca R. Schow

VIII. CLAIMS APPENDIX

1. (original) A method of forming an interface between components having different rates of volumetric expansion, said method comprising forming an interface surface of said interface with respect to a center of growth such that slippage occurs at said interface between said components during volumetric expansion.

2. (original) The method of claim 1, further comprising:

defining an axis of volumetric expansion for a first component;

projecting a sphere with a center on said axis; and

defining the center of said sphere as said center of growth.

3. (original) The method of claim 2, further comprising:

projecting a perimeter of said first component onto said sphere to define a projection line; and

forming said interface surface based on a plurality of planes each of which includes said center of growth, a point on said projection line and a tangent to that point on said projection line.

4. (original) The method of claim 3, wherein said forming said interface surface further comprises forming said interface surface tangent to all of said planes in said plurality of planes.

5. (original) The method of claim 3, further comprising

defining a second axis of volumetric expansion for a second component;

projecting a sphere with a center on said second axis; and

defining the center of said sphere as said center of growth.

projecting a perimeter of said second component onto said sphere to define a second projection line; and

forming a second interface surface in said assembly based on a plurality of planes each of which includes said center of growth, a point on said second projection line, and a tangent to that point on said second projection line.

6. (original) The method of claim 5, wherein said forming said interface surface further comprises forming said interface surface tangent to all of said planes in said plurality of planes.

7. (original) The method of claim 3, further comprising forming a second component having a complimentary interface surface that is configured to interface with said interface surface.

8. (original) The method of claim 7, wherein said complimentary interface surface of said second component substantially corresponds to said interface surface.

9. (original) The method of claim 1, wherein said components comprise components in a thermally cycled device.

10. (original) The method of claim 9, wherein said thermally cycled device comprises a fuel cell system.

11. (original) The method of claim 10, wherein said fuel cell system comprises a solid oxide fuel cell system.

12-31. (allowed)

32-47. (cancelled)

IX. Evidence Appendix

None

X. Related Proceedings Appendix

None

XI. Certificate of Service

None